occasional papers of the

# Farlow Herbarium of cryptogamic botany

No. 11 February 1977 Harvard University, Cambridge, Massachusetts

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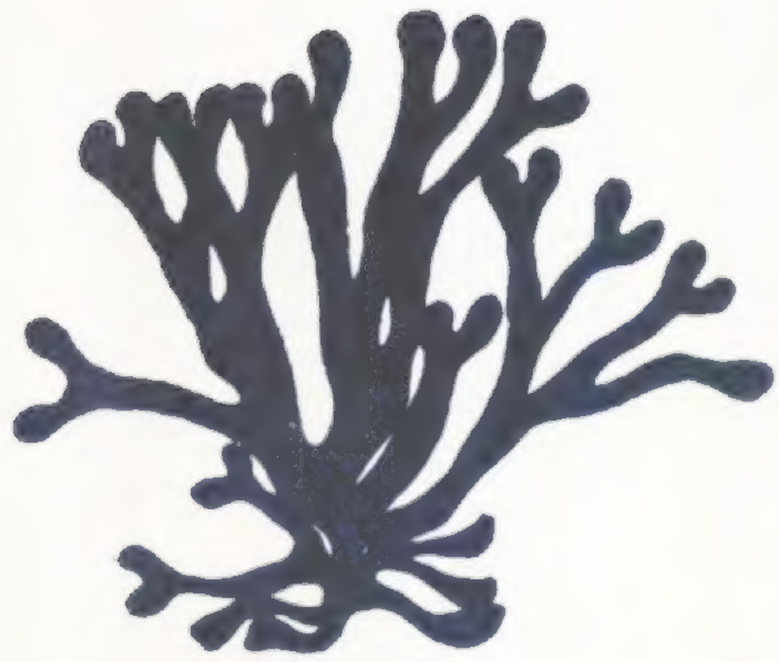

Edited by: Reed C. Rollins
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# AN ANNOTATED BIBLIOGRAPHY OF THE AMERICAN MICROSCOPIST AND DIATOMIST JACOB WHITMAN BAILEY (1811–1857)

ROBERT K. EDGAR[1]

## INTRODUCTION

Jacob Whitman Bailey was an early American microscopist—the "Ehrenberg of America" according to his scientific contemporaries—one whose research focused on microscopic organisms, generally the infusoria and particularly the diatoms, and on microscopic geology. But, in contrast to the nearly five decades that Ehrenberg worked in this field, Bailey completed barely two before his early death at the age of 45. During the last ten years of his life he was an invalid, the object of increasingly fading physical abilities; still, the productivity of his pen remained extraordinarily high. It is certainly no tribute to the painful, pioneer accomplishments of this man that all too frequently his scientific collections have been treated imprudently and that his literature has been examined superficially. In part, this bibliography provides a facility for renewed access to his published, scientific contributions.

In 1857, Bailey bequeathed his large collection of microscopic objects to the Boston Society of Natural History, which was its caretaker until 1941, when it was donated to the Farlow Herbarium of Harvard University, where it currently resides. As a prerequisite to the restitution and indexing of this collection, a task I began early in 1976, the establishment of a complete and accurate list of Bailey's published, scientific contributions was mandatory. I was unable to find in the literature such a list. Even bibliographies which purported to present only a specific portion of his literature were frequently incomplete and in error. I have attempted to fill this void, especially as it related to diatoms, by this work.

This bibliography is primarily the product of my having examined the original, scientific articles referred by all the citations to Jacob Whitman Bailey (1811–1857) contained in: (1) the *Catalogue of Scientific Papers, 1800–1863* and *1874–1883* (Royal Society of London, 1867 and 1891); (2) *A Bibliography of American Natural History, Pioneer Century, 1769–1865* (Meisel, 1929); (3) the Tilden Algae Index at the Farlow Herbarium; (4) *The National Union Catalog, Pre-1956 Imprints* (Library of Congress and American Library Association, 1969); (5) the card catalogs of the following libraries: the Farlow Herbarium, the Gray Herbarium, and the Museum of Comparative Zoology of Harvard University; the Marine Biological Laboratory at Woods Hole; and the Diatom Herbarium of the

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Academy of Natural Sciences of Philadelphia; (6) the library and archives of the U.S. Military Academy at West Point, New York; (7) the volume indices of the first and second series of the *American Journal of Science and Arts;* and (8) the "references" sections of the diatom catalogs of Habirshaw (Chase, 1885), DeToni (1891), Mills (1933), and VanLandingham (1967–1975). All these citations are accounted for in this bibliography, including those I have determined to have been mistakenly attributed to Bailey. Several references not derived from the above resources are presented also.

In each of the citations in this bibliography, Jacob Whitman Bailey is the sole author unless otherwise indicated. Citations are presented by year; within any one year they are grouped initially by serial, then consecutively by volume and page within the serial. With a few exceptions, only the original references to articles are cited independently; subsequent reprints, translations and summaries are listed only in conjunction with the original. The letter l has been omitted from all alphabetic sequences within years.

## ANNOTATED BIBLIOGRAPHY

**1837a–b** Notes on chemistry, etc. Am. J. Sci. Arts **31**(2):292–294, *fig.* 1–5.

Two distinctly different notes are presented. Each is cited separately in this bibliography as 1837a and 1837b.

**1837a** Substitute for frogs in galvanic experiments. Am. J. Sci. Arts **31**(2):292, *fig.* 1.

The use of grasshopper legs in Galvani's experiments is advocated and directions are given. [See 1837a–b.]

**1837b** Washing bottles, Am. J. Sci. Arts **31**(2):292–294, *fig.* 2–5.

The continuous washing and filtering devices of Berzelius and Gay-Lussac are explained in order to further their use by practical chemists. [See 1837a–b.]

**1837c** Account of an excursion to Mount Katahdin, in Maine. Am. J. Sci. Arts **32**(1): 20–34, 1 *pl.*

A travelogue notes primarily the regional geology and phanaerogamic vegetation.

**1837d–f** Notes on chemistry, etc. Am. J. Sci. Arts **32**(1):85–88, 5 *figs.*

Three short heterogeneous notes are presented. Each is cited separately in this bibliography as 1837d, 1837e, and 1837f.

**1837d** On a new test for nitric acid. Am. J. Sci. Arts **32**(1):85–86, 1 *fig. Also:* Bibliothèque brittan. (Genève) **9**:189–191; and J. prakt. Chem. **12**:56–58; and Ann. Elect. Magn. Chem. **2**:282–284 (1838). [The first three paragraphs and single figure of the original article are omitted in these reprints, but in other respects each is a fairly faithful copy or translation.]

A distillatory, colorimetric assay for nitric acid is described. [See 1837d–f.]

**1837e** Locality of hyalite at West Point. Am. J. Sci. Arts **32**(1):87.

An incrustation of the highly siliceous mineral hyalite is reported on gneiss near West Point. [See 1837d–f.]

**1837f** Curious effects of a current of air on the flame of lamps, etc. Am. J. Sci. Arts **32**(1):88, 4 *figs.*

Observations of the effects of air currents on the movement of the flame of common alcohol lamps are made. [See 1837d–f.]

**1837g** On the common blowpipe. Am. J. Sci. Arts **32**(2):319–325, *fig.* 1–3.

Notes are presented from Bailey's West Point chemistry course on the use of the blowpipe as an instrument of qualitative chemical analysis.

**1838a–b** Observations on the vascular system of ferns, and notice of a monstrous flower of *Orchis spectabilis*. Am. J. Sci. Arts **35**(1):113–117, *pl.* 1.

This article consists of two completely unrelated notes. Each is cited separately in this bibliography as 1838a and 1838b.

**1838a** On the vascular system of ferns. Am. J. Sci. Arts **35**(1):113–116.

After reviewing the conflicting literature on the presence of "spiral vessels" (i.e., tracheids) in ferns, Bailey demonstrates that the "vessels" are torn readily, producing a spiral appearance, especially in younger plants, and are thus mistaken for true "spiral vessels." He concludes that "spiral vessels" do not occur in ferns but can occur in some species of *Equisetum*. [See 1838a–b.]

**1838b** Notice of a monstrous flower of *Orchis spectabilis*. Am. J. Sci. Arts **35**(1):117, *pl.* 1.

A very brief account of a flower of *Orchis* stresses that it is normally formed except for "three perfectly formed stamens" instead of one, a condition Bailey considers a "return to the normal state of the Orchideae." [See 1838a–b.]

**1838c** On fossil infusoria, discovered in peat-earth, at West Point, N.Y., with some notices of American species of Diatomae. Am. J. Sci. Arts **35**(1):118–124, *pl.* 2.

This is both the first American report devoted primarily to diatoms and the first paper dealing exclusively with American diatoms. Several living and fossil diatom species are illustrated, but there is little discussion of them. A European paper on the animal-versus-vegetable nature of the Bacillaria is quoted extensively, with Bailey indicating that he leans toward its being animal because the organisms exhibit "voluntary motility."

**1841a** A sketch of the infusoria, of the family Bacillaria, with some account of the most interesting species which have been found in a recent or fossil state in the United States. [Part I, Desmidiacea.] Am. J. Sci. Arts **41**(2):284–305, *pl.* 3 (or 1). *Also:* Assoc. Am. Geol. Nat. Rep. [1843]:112–134, *pl.* 1 (1843). *Also: in* Mather, W. W., E. Emmons, L. Vanuxem and J. Hall *Geology of New York* (1842–1843). Part I, Comprising the geology of the first geological district; pp. 50–65, *pl.* 21 (1843).

Following a translation of Ehrenberg's brief account of the characters of the family, Bailey presents descriptions of 12 genera of desmids, taken largely from the original authors but with his own observations added extensively. His ideas on the morphological variability within species and genera, and on the animal-versus-vegetable nature of desmids, are developed. Ehrenberg's key to genera of the family is included. Many desmids are illustrated, but many are left unnamed to species by Bailey because he had not yet seen several pertinent European works. [Continued in 1842a and 1842e.]

**1841b** [Excerpt from a letter from J. W. Bailey to B. Silliman, Jr. concerning American polythalamia.] p. 401, *fig.* 1–4. *In* [Silliman, B., Jr., ed.] American polythalamia from the Upper Mississippi, and also from the cretaceous formation on the Upper Missouri. Am. J. Sci. Arts **41**(2):400–401, *fig.* 1–4.

The structure of polythalamia in "prairie chalk" from the Upper Mississippi is described, and a comparison is made of the polythalamia in different American deposits.

**1841c** [Letter dated 19 September 1840, from J. W. Bailey to Prof. E. Hitchcock concerning siliceous, fossil infusoria in Massachusetts.] *In* Hitchcock, E. *Final Report on the Geology of Massachusetts*, vol. 2, pp. 311–315, *pl.* 20. J. S. & C. Adams, Amherst.

Bailey indicates that diatoms are distributed extensively in both living and fossil states. He lists the most common genera and species occurring in deposits from several Massachusetts localities. He clearly considers diatoms to be animals because of their "active and voluntary motions" and reproduces a sketch from Ehrenberg illustrating the internal organs and means of locomotion of diatoms. Occasionally he is critical of Ehrenberg's taxonomy. An excellent plate contains figures of more than 20 diatoms.

**1841d** Fossil infusoria. *In* Hitchcock, E. [see 1841c], p. 758, *fig.* 234.

A single figure drawn by Bailey illustrates several fossil diatoms as they would appear strewn on a microscope slide.

**1841e** [Report of a verbal communication on 24 August 1841, by J. W. Bailey to the Academy of Natural Sciences of Philadelphia concerning calcareous marls from the Upper Missouri.] Proc. Acad. nat. Sci. Phila. **1**(5):75.

Bailey relates his discovery of fossil foraminifera (=polythalamia) in marls from the Upper Missouri that are similar to those detected in deposits in New Jersey and Alabama.

**1841f** [Report of a verbal communication on 24 August 1841, by J. W. Bailey to the Academy of Natural Sciences of Philadelphia concerning silicified wood found near Fredericksburg, Va.] Proc. Acad. nat. Sci. Phila. **1**(5):75.

Fossil pines and cycads preserved by silica impregnation in a feldspathic sandstone are reported, following their discovery by William B. Rogers.

**1841g** [Silliman, B. and B. Silliman, Jr., eds.] Fossil foraminifera in the green sand of New Jersey. Am. J. Sci. Arts **41**(1):213–214.

This is not an article by J. W. Bailey but rather an editorial notice that Bailey will report in the next issue of the journal on the foraminifera in the greensand of New Jersey and the limestones of Alabama, and on W. B. Roger's discovery of a Tertiary infusorial stratum in Virginia.

**1842a** A sketch of the infusoria, of the family Bacillaria, with some account of the most interesting species which have been found in a recent or fossil state in the United States. Part II. [Naviculacea.] Am. J. Sci. Arts **42**(1):88–105, *pl.* 2. *Also:* Assoc. Am. Geol. Nat. Rep. [1843]:134–152, *pl.* 2 (1843). *Also: in* Mather, W. W., E. Emmons, L. Vanuxem and J. Hall *Geology of New York* (1842–1843). Part I, Comprising the geology of the first geological district; pp. 65–79, *pl.* 22 (1843).

The characteristics and distribution in the United States of numerous species of ten diatom genera are presented, based on Bailey's own observations and those assimilated primarily from Pritchard and Ehrenberg. His ideas on systematics and the structure of the diatom shell are frequently encountered in his accounts of the species. Much of the material was previously published in Hitchcock's *Final Report on the Geology of Massachusetts* [see 1841c]. Forty-two figures of diatoms, many left unnamed to species, compose the plate. [Continued from 1841a and in 1842e.]

**1842b** Curious microscopic fungus, *Craterium pyriforme*. [Letter dated 15 November 1841, from J. W. Bailey to B. Silliman, Jr., ed.] Am. J. Sci. Arts **42**(1):195.

A bleeding phenomenon occurs upon puncturing a particular "fungus" which is reported to grow commonly in the vicinity of West Point. This "fungus" is later shown to be the egg of a mite. [See 1842g.]

**1842c** [Letter dated 22 November 1841, from J. W. Bailey to B. Silliman, Jr., ed. concerning pollen showers.] pp. 196–197, *fig.* 1–4. *In* [Silliman, B., Jr., ed.] Yellow showers of pollen. Am. J. Sci. Arts **42**(1):195–197, *fig.* 1–4.

On the basis of the microscopic examination of powders which rained down in New York and Massachusetts, Bailey indicated that the latter were pine pollen and the former were a mixture of pollen from various unidentified trees.

**1842d** [Silliman, B., and B. Silliman, Jr., eds.] Microscopic fungus. Am. J. Sci. Arts **43**(1):205–206, 4 *figs.*

This note was not authored by J. W. Bailey but by the editors who indicate that the "fungus," previously referred to by Bailey as "bleeding," is actually the egg of a mite. [See 1842b.]

**1842e** A sketch of the infusoria, of the family Bacillaria. Part III. [Echinellea and Lacernata.] Am. J. Sci. Arts **43**(2):321–332, *pl.* 5 (or 3). *Also:* Assoc. Am. Geol. Nat. Rep. [1843]:153–164, *pl.* 3 (1843). *Also: in* Mather, W. W., E. Emmons, L. Vanuxem and J. Hall *Geology of New York* 1842–1843. Part I, Comprising the first geological district; pp. 238–245, *pl.* 42, 1843.

The characteristics and distribution of a few species of eight diatom genera, whose cells usually attach individually to substrates (Echinellea), and five diatom genera, whose cells usually grow in mucilagi-

nous colonies (Lacernata), are presented. They are based primarily on Bailey's own observations and the works of Ehrenberg. Seventeen figures of diatoms, many unidentified to species, are included in the plate along with several figures of siliceous protozoa and spicules found in fossil deposits in Virginia. [Continued from 1841a and 1842a.]

**1842f** Ehrenberg's notices of American infusoria. Am. J. Sci. Arts **43**(2):393–395.

Bailey briefly relates Ehrenberg's comparison of the fossil and Recent infusoria of North and South America with those of Europe and his characterization of the American infusorial deposits, which includes a list of 47 fossil and 25 Recent species, primarily diatoms. Bailey indicates some disagreement with Ehrenberg's conclusions based on his own American experiences, and notes the recent discovery by William B. Rogers of an infusorial stratum in Virginia.

**1842g** On the existence of siliceous? spiculae in the exterior rays of *Actinia;* and memoranda concerning the siliceous animalcules of Boston. Boston J. nat. Hist. **4**(2):252–255, *fig.* 1–2. [As the result of a typographical error the author is indicated as G. W. Bailey. This error has been perpetuated generally in the bibliographical literature.] *Also:* Proc. Boston Soc. nat. Hist. **1**:77 (1844). [An abstract of the paper which was read at the meeting of 20 July 1842 is reported only.] *Also:* Ann. Mag. nat. Hist. **12**:38–39, *fig.* 1 (1843). [Title: On the existence of siliceous? spiculae in the exterior rays of *Actinia.*] [Only the initial section of the original article dealing with sponge spiculae and its figure are reprinted here.]

Collections of marine sponges and diatoms are reported, with an interest in comparing living species with those previously found only in Virginia fossil deposits. The apparently siliceous spiculae of living *Actinia* are postulated to be similar to those from Eocene deposits. A new diatom genus, *Emersonia*, is described.

**1843a** [Summary of a paper read by J. W. Bailey on 27 April 1843, to the Association of American Geologists and Naturalists on crystals in dicotyledonous plants.] pp. 149–151. *In* [Rogers, H. D., chairman, and B. Silliman, Jr., secretary] Abstract of the Proceedings of the Fourth Session of the Association of American Geologists and Naturalists. Am. J. Sci. Arts **45**(1):135–165.

This report contains a condensed version of the paper entitled "On the crystals which occur spontaneously formed in the tissues of plants," which appeared later in the *American Journal of Science and Arts.* [See 1845a.]

**1843b** [Summary of a paper read by J. W. Bailey on 29 April 1843, to the Association of American Geologists and Naturalists on infusorial deposits at Petersburg, Va.] p. 313. *In* [Rogers, H. D., chairman, and B. Silliman, Jr., secretary] Abstract of the Proceedings of the Fourth Session of the Association of American Geologists and Naturalists. Am. J. Sci. Arts **45**(2):310–353.

The diatoms and other infusoria from two fossil deposits in Virginia are compared with those of adjacent Miocene beds. Bailey also related his observations on polythalamia from Texas and fossil trees and lignite from Maryland.

**1844a** Account of some new infusorial forms discovered in the fossil infusoria from Petersburg, Va. and Piscataway, Md. Am. J. Sci. Arts **46**(1):137–141, *pl.* 3.

Discussions and illustrations of several new species of diatoms are presented primarily, but notes are made on several species of silicoflagellates and sponge spicules and on some "anomalous bodies." Bailey indicates that some species, previously known only from fossil deposits, have been found living, that the different infusorial marls may be unique with respect to their fossil constituents, and that there is a remarkable similarity between the Recent infusoria of American sandy seacoasts and those of the chalk marls of Europe and Africa, as elucidated by Ehrenberg. He comments also on the morphological variability within certain diatom species from a taxonomic viewpoint.

**1844b** [Bailey, J. W. and B. Silliman, Jr.] Notice of a memoir of C. G. Ehrenberg, "On the extent and influence of microscopic life in North and South America." Am. J. Sci. Arts **46**(2):297–313. 1 *fig.*

Parts of Ehrenberg's 1843 book, *Verbreitung und Einfluss . . . Sud und Nord Amerika . . .* , are summarized with an emphasis on the U.S. findings in order to provide a preliminary sketch of the work to American readers. The authors present Ehrenberg's observations and views on: (1) the ecological roles of infusoria and their comparative distribution in the Americas; (2) the fossil infusoria, especially the diatoms, of the Richmond, Virginia deposits; (3) the desmid and diatom flora near West Point—in which Ehrenberg supplies names for many of the diatom and desmid figures in Bailey's papers on "American Bacillaria" [see 1841a and 1842a]; (4) a comparison of the American fossil deposits with those of Europe and Africa; (5) the infusoria of various New England localities; (6) the means of obtaining infusoria for study; and (7) the constancy of the form of diatom species. The authors note the most recent American findings as well as their disagreement with some of Ehrenberg's taxonomic and geological conclusions.

**1845a** On the crystals which occur spontaneously formed in the tissues of plants. Am. J. Sci. Arts **48**(1):17–32, *pl.* 1. *Also:* Am. J. Sci. Arts **45**(1):149–151. [See 1843a.] *Also:* Not. Geb. Natur–Heilk. **35**(5): col. 65–69; and Bibliothèque brittan. (Genève). Partie Sci. **56**:388–392. [These are condensed accounts of Bailey's article bearing his name and its title, but both are unillustrated and neither was authored by him.]

Three fundamental forms of mineral crystals are recognized in plants and are examined by microscopy and microchemical tests. Their distribution in dicotyledonous plants is presented extensively, and their absence in some groups of phanerogams and in all cryptogams is noted. Bailey concludes his observations by speculating: "Are the fall of leaves, the shedding of the bark, and the rotting of wood, Nature's beautiful methods of distributing this fertilizer over the soil?"

**1845b** Ehrenberg's observations on the fossil infusoria of Virginia and Maryland, and comparison of the same with those found in the chalk formations of Europe and Africa. Am. J. Sci. Arts **48**(1):201–204. *Also:* The Virginias, no. 4, pp. 56–57 (1881).

This summary of Ehrenberg's report to the Berlin Academy (February, 1844) on American fossil infusoria includes a comparison of American deposits with those of Europe and Africa. Bailey comments frequently on Ehrenberg's taxonomy and the age of the Virginia and Maryland deposits. Also presented are Ehrenberg's determinations of the names appropriate to the figures in Bailey's 1844 paper on these deposits [see 1844a] and his descriptions of six new "American" diatom genera.

**1845c–k** Notice of some new localities of infusoria, Fossil and Recent. Am. J. Sci. Arts **48**(2):321–343, *pl.* 4.

This notice includes nine separate notes on infusoria from different localities. With the exception of the two notes on the Bermuda and Virginia–Maryland deposits, which share a common table on pages 331–335 and are compared to one another, the short articles are largely independent. Each note is cited separately in this bibliography as 1845c, 1845d, . . . , 1845k.

**1845c** Fossil infusoria from the Oregon Territory. Am. J. Sci. Arts **48**(2):321–323, *pl.* 4, *fig.* 1–10.

Several new species of diatoms are reported from samples of Tertiary freshwater infusoria collected in Oregon, but their names are deferred by Bailey to Ehrenberg's "undoubted authority." These samples were derived from the Wilkes Exploring Expedition via J. D. Dana. Many of the species discovered were considered extinct because they had not been revealed in previous samples of living diatoms from the region examined by either Ehrenberg or Bailey [see 1845p]. Bailey compares these Oregon deposits with those in the northeastern U.S. [See 1845c–k.]

**1845d** Fossil infusoria from the Bermuda Islands. Am. J. Sci. Arts **48**(2):323–335, *pl.* 4, *fig.* 11–20, A, D, E, G.

Ehrenberg's analysis of samples of Bermuda tripoli is presented by Bailey. Emphasis is given to descriptions of new genera, subgenera, and species discovered in the deposits by Ehrenberg and the demonstration that the deposits are similar to those of Virginia and Maryland. An extensive table of Ehrenberg's findings, with additions by Bailey, is included. [See 1845c–k.]

**1845e** Fossil infusoria of Virginia and Maryland. Am. J. Sci. Arts **48**(2):330–337, *pl.* 4, *fig.* 11, 24–28, B, C.

Bailey presents a tabulated comparison of the fossil infusoria of eight Virginia and Maryland deposits and infusoria from Recent localities along the U.S. coast, as determined by himself, with those from Bermuda tripoli, as determined primarily by Ehrenberg. A few unnamed species of diatoms are described and illustrated. His observations are synthesized into the formulation of three groups of infusoria characterizing all the collections: (1) cosmopolitan Recent

marine species, which are well-represented in the fossil deposits; (2) species almost exclusively fossil; and (3) species almost exclusively Recent. From this he concludes that "It hence appears that the same successive extinction of some species and creation of others, which has taken place with regard to the larger tribes of organic beings, has also occurred with the most minute races." [See 1845c–k.]

**1845f** Recent infusoria in the blue mud of New Haven Harbor. Am. J. Sci. Arts **48**(2): 337–338, *pl.* 4, *fig.* 29.

Several diatom species, including a new but unnamed species of *Dicladia,* and other infusoria are reported from silica-alumina-rich mud from New Haven. [See 1845c–k.]

**1845g** Recent infusoria in mud from Charlestown Harbor, S.C. Am. J. Sci. Arts **48**(2): 338.

Twenty-one species of diatoms, some calcareous polythalamia, and other infusoria are recorded. [See 1845c–k.]

**1845h** Fossil infusoria in guano. Am. J. Sci. Arts **48**(2):338.

A few Recent diatoms are reported from South American guano. [See 1845c–k.]

**1845i** Fossil infusoria of Nova Scotia. Am. J. Sci. Arts **48**(2):339. [The citation initiated by DeToni (1891) entitled "Infusoria from Earlton Lake" refers to this note.]

Sixteen freshwater species of fossil diatoms and a few other siliceous organisms are reported from two localities in Nova Scotia. [See 1845c–k.]

**1845j** Fossil infusoria with the bones of the mastodon. Am. J. Sci. Arts **48**(2):339–340.

After discovering fossil diatoms, desmids, pollen and other organic debris in a marl embedded in mastodon bones from New York, Bailey points out that the "siliceous infusoria" in the marl, which were contemporaneous with the mastodon, are the same as those now living. He notes also that "membranaceous infusoria," such as desmids, are preserved in calcareous marls. [See 1845c–k.]

**1845k** Fossil polythalamia of the United States. Am. J. Sci. Arts **48**(2):340–342, *pl.* 4, *fig.* 30–31.

Twenty North American localities are listed in which fossil polythalamian deposits have been discovered. The formation of casts of polythalamian shells and the use of characteristic polythalamia as index fossils are mentioned. [See 1845c–k.]

**1845m** [Report of a paper presented by J. W. Bailey to the Association of American Geologists and Naturalists on 3 May 1845, on "Plants of the genus *Rhizomorpha.*"] Proc. Assoc. Am. Geol. Nat. 6:51–53.

Environmental effects on the growth and phosphorescence of the fungus *Rhizomorpha* are discussed.

**1845n** [Report of a paper presented by J. W. Bailey to the Association of American

Geologists and Naturalists on 5 May 1845, on a "New locality of fossil fluviatile infusoria in Oregon."] Proc. Assoc. Am. Geol. Nat. **6**:64–65. *Also:* Am. q. J. Agric. Sci. **2**:163. [Title: Freshwater Formation in Oregon.] [This brief account of the Assoc. Am. Geol. Nat. paper was neither authored by Bailey nor reprinted from the original report.]

Thirteen species of diatoms and a few species of other infusoria are reported from a deposit buried under 100 feet of volcanic rock along an escarpment on the Rivère aux Chultes in Oregon. These species were identified from samples collected by Williamson and Abbot's Pacific Railroad Expedition.

**1845o** [Report of a paper presented by J. W. Bailey to the Association of American Geologists and Naturalists on 5 May 1845, "On some of the fossil coniferous trees of the United States."] Proc. Assoc. Am. Geol. Nat. 6:81–82.

Bailey indicates that little work has been done in microscopic botany in the U.S., but nevertheless, based on the microscopic assessment of fossil wood from several American localities, all the fossil wood is coniferous.

**1845p** Fossil fresh water infusoria from Oregon. *In* Hall, J. Nature of the geological formations occupying the portion of Oregon and North California included in a geological survey under the direction of Capt. Fremont. App. A, p. 302, *pl.* 5. *In* Report of the Exploring Expedition to the Rocky Mountains in the year 1842 and to Oregon and North California in the years 1843–1844 by Brevet Captain J. C. Fremont of the Topographical Engineers, under the orders of Col. J. J. Abert, Chief of the Topographical Bureau. U.S. Senate Exec. Docums. vol. 11, no. 174 (28th Congress, 2nd Session), serial no. 461. *Also:* U.S. House Exec. Docums. vol. 4, pt. 2, no. 166 (28th Congress, 2nd Session), serial no. 467.

A single plate presents numerous figures of diatoms and some of other siliceous infusoria including those of two new, but unnamed, species of *Gallionella*. In the legend, Bailey comments on the reasons for size differences in individuals within the same species.

**1845q** [Extract of a letter from J. W. Bailey to J. Hall concerning calcareous polythalamia in a Cretaceous? formation in Oregon.] App. A, p. 300 [footnote]. See references for entry 1845p.

Calcareous polythalamian fossils are used to date a specimen of "impure limestone" from Oregon as probably Cretaceous.

**1845r** [Report of a paper on "Notes on American polythalamia" by J. W. Bailey, presented to the National Institution for the Promotion of Science on 6 April 1845.] Bull. Proc. nat. Inst. Promo. Sci. 3:432.

This citation refers only to the statement that A. D. Bache read a paper authored by J. W. Bailey on "Notes on American polythalamia." No other information is given.

**1846a** On some new species of American Desmidiaceae from the Catskill Mountains. Am. J. Sci. Arts, ser. 2, **1**(1):126–127, *fig.* 1–5.

Three new species of desmids are described: *Euastrum muricatum*, *Closterium nodosum* and *C. verrucosum*.

**1846b** On the detection of spirally dotted, or scalariform ducts, and other vegetable tissues in anthracite coal. Am. J. Sci. Arts, ser. 2, **1**(3):407–410, *fig.* 1–5. *Also:*

Ann. Mag. nat. Hist. **18**:67–69. [This reference bears no figures but otherwise differs from the Am. J. Sci. Arts article in minor, non-substantive ways only.]

An examination of the kinds of vegetable cell remains detectable in partially burned coal leads to the conclusion that coal is composed of layers of vegetable matter derived from acotyledonous plants, probably ferns or lycopods.

**1847a** Notes on the algae of the United States. Am. J. Sci. Arts, ser. 2, **3**(7):80–85; 3(9):399–403.

These notes by Bailey were initiated by John Torrey's interest in having the algae covered in his work on the botany of New York State and by his inducing Bailey to undertake the task. Bailey indicates that previous American work has yielded a flora of only about 20 algal species. However, as a result of collections made primarily in Connecticut, New York, and Rhode Island, and following Harvey's arrangement of the algae, he reports the distributions and comments on 24 species of Melanospermeae, 31 species of Rhodospermeae, and 77 species of Chlorospermeae (including desmids and blue-green algae). Several new species of Chlorospermeae are described. [Continued in 1848d.]

**1847b** [Review of] Foraminifères fossiles du bassin tertiare de Vienne, decrits par Alcide D'Orbigny. Paris, 1846. Am. J. Sci. Arts, ser. 2, **4**(12):452–454.

In this book review, Bailey equates the Foraminifera of D'Orbigny with the Polythalamia of Ehrenberg, stresses the ecological importance of foraminifera, and lists genera and species characteristic of different geological time periods as a prelude to arguing for their use as time indicators in geological deposits. Bailey alludes also to the occurrence of foraminifera in the Gulf Stream, and to allied works on these organisms.

**1847c** [Report of a paper presented by J. W. Bailey to the Association of American Geologists and Naturalists on 22 September 1847, on the formation of coal.] Am. q. J. Agric. Sci. **6**(18):218.

This report consists entirely of the statement that Bailey indicated in his paper that coal is largely composed of the deciduous, soft parts of non-arborescent plants.

**1847d** [Report of microscopic analysis of sediments from deep sea soundings.] *In* Bache, A. D. Report of the Superintendent of the Coast Survey, showing the progress of the work during the year ending October, 1847, pp. 25–26, Sect. 2. From Point Judith to Cape Henlopen, including the coast of Connecticut, New York, New Jersey, Pennsylvania, and part of Delaware. pp. 18–26. *In* Young, M. Letter from the Acting Secretary of the Treasury communicating the report of the Superintendent of the Coast Survey, showing the progress of that work. U.S. Senate Exec. Docums. vol. 3, no. 6 (30th Congress, 1st Session), serial no. 505. [I have been unable to locate a corresponding House Executive Document containing this report.]

A high concentration of polythalamia is very briefly reported from sediments taken by sounding.

**1848a** [Letter dated 27 November 1847, from J. W. Bailey on Spencer's microscope.] *In* Gilman, C. R. An account of a compound achromatic microscope, made by Charles A. Spencer of Canastota, N.Y., pp. 238–239. Am. J. Sci. Arts, ser. 2, **5**(14):237–240.

Bailey attests to the high quality of Spencer's lens in comparison to those of European manufacturers. The use of the diatom, *Navicula hippocampus*, is noted as a resolution test-object.

**1848b** Spencer's microscopes. [Letter from J. W. Bailey dated 4 February 1848 to B. Silliman, Jr., ed.] Am. J. Sci. Arts, ser. 2, **5**(14):285–286.

A discussion centers on the use of different diatoms as resolution test-objects and a new species from New York, *Navicula spencerii*, is proposed as the most difficult. A comparison is made also of Spencer's microscope with those made in Europe.

**1848c** Spencer's microscopes. [Letter from J. W. Bailey dated 8 April 1848 to the editors of the *American Journal of Science and Arts.*] Am. J. Sci. Arts, ser. 2, **5**(15):443.

The resolving ability of several microscopes is compared in the examination of different diatom test-objects.

**1848d** Continuation of the list of localities of algae in the United States. Am. J. Sci. Arts, ser. 2, **6**(16):37–42.

Based largely on the examination of new collections from South Carolina and Florida, Bailey reports the distributions and comments on 8 species of Melanospermeae, 30 species of Rhodospermeae, and 22 species of Chlorospermeae. Several new species are described by Bailey, and several by W. H. Harvey, with whom Bailey worked closely on the collections. The views of the two investigators on the various taxa are encountered frequently. To date, the total U.S. algal flora, exclusive of diatoms and desmids, is given as 31 species of Melanospermeae, 59 species of Rhodospermeae, and 82 species of Chlorospermeae. [Continued from 1847a.]

**1848e** [A communication entitled "Notes on the infusoria of the Mississippi River" from J. W. Bailey read by A. A. Gould to the Boston Society of Natural History on 19 February 1845.] Proc. Boston Soc. nat. Hist. **2**:33–35.

Bailey's examination of water from the Mississippi River revealed no polythalamia but an abundance of other infusoria, primarily diatoms, desmids, euglenas and some rotifers. He remarks that the waters of the Mississippi are "crowded with organic life" and that the shells of these organisms must be carried to, and deposited in association with, Recent marine species in the Gulf of Mexico.

**1848f** Notes concerning the minerals and fossils, collected by Lieutenant J. W. Abert, while engaged in the geographical examination of New Mexico. *In* Abert, J. W. Report of Lieut. J. W. Abert on his examination of New Mexico in the years 1846–47, pp. 131–132, 3 *pl. In* Report of the Secretary of War communicating, in answer to a resolution of the Senate, a report and map of the examination of New Mexico, made by Lieutenant J. W. Abert, of the topographical corps. U.S. Senate Exec. Docums. vol. 4, no. 23 (30th Congress, 1st Session), serial no. 506.

*Also:* Notes . . . New Mexico, pp. 547–548, 3 *pl. In* Abert, J. W. Report . . . New Mexico . . . 1846–47. *In* Emory, W. H. Notes of a military reconnoissance from Fort Leavenworth, in Missouri to San Diego, in California including part of the Arkansas, Del Norte, and Gila Rivers. U.S. House Exec. Docums. vol. 4, no. 41 (30th Congress, 1st Session), serial no. 517. *Also:* Notes . . . New Mexico. *In* Gavin, J. Western America in 1846–1847. The original travel diary of Lieutenant J. W. Abert who mapped New Mexico for the U.S. Army. App. B, pp. 105–106. J. Howell, San Francisco. 1956.

On the basis of invertebrate and vertebrate fossils examined from Poblazon, west of the Rocky Mountains, Bailey concludes that the deposits on the two sides of the Rockies were laid down "by the same ocean" and that the mountains have been elevated since the Cretaceous. From a locality east of the Rocky Mountains, he reports on coal fossil deposits, and some non-fossiliferous rocks and minerals.

**1848g** Bache, A. D. Report of the Superintendent of the Coast Survey showing the progress of the work for the year ending November 13, 1848. *In* Walker, R. J. Report of the Secretary of the Treasury communicating a report of the Superintendent of the Coast Survey, showing the progress of that work during the year ending November, 1848. U.S. Senate Exec. Docums. vol. 1, no. 1 (30th Congress, 2nd Session), serial no. 529. *Also:* Bache, A. D. Report . . . 1848. *In* Walker, R. J. Letter from the Secretary of the Treasury transmitting the report of the Superintendent of the Coast Survey. U.S. House Exec. Docums. vol. 4, no. 13 (30th Congress, 2nd Session), serial no. 540. [I have been unable to determine the actual publication dates of these reports, whether 1848 or 1849.]

In this report under Section 1, "From Passamaquoddy Bay to Point Judith, including the coast of Maine, New Hampshire, Massachusetts, and Rhode Island," on page 28 Bache indicates that Bailey's microscopic analysis of sediments from Boston Harbor revealed "no characteristic differences in the organic remains." No other pertinent information is given.

**1849a** Some remarks on the *Navicula spencerii*, and on a still more difficult test object. Am. J. Sci. Arts, ser. 2, 7(20):265–270.

The description and use of *Navicula spencerii* as a test-object for microscopic resolution are recounted, and a disagreement between Bailey and De la Rue over the nature of the structure of the diatom shell producing its fine lines is presented. Bailey also defends the resolving ability of Spencer's lens and the difficulty of *N. spencerii* as a test-object. A new, finer test-object, *Grammatophora subtilissima, n. sp.*, is introduced.

**1849b** New localities of infusoria in the Tertiary of Maryland. Am. J. Sci. Arts, ser. 2, 7(21):437.

Bailey notes the northern limit of infusorial strata in two Maryland localities and indicates that the infusoria in them are the same as those in the Piscataway deposits and that he expects the strata to continue across Chesapeake Bay and south into the Carolinas.

**1849c** [A note that on 21 September 1848, Prof. L. Agassiz read a paper entitled "On microscopic foraminifera, from the soundings of the Coast Survey" by J. W. Bailey

to the American Association for the Advancement of Science.] Proc. Am. Assoc. Advmt. Sci. 1:32.

No information other than that cited above is given, but the content of this paper was apparently the same as that contained in reference 1851o; see the introductory letter from A. D. Bache to J. Henry on page 3 of reference 1851o.

**1849d** Ehrenberg, C. G. Monatsbericht. Akad. Wiss. (Berlin), p. 64.

Part of the diatom literature cites this report as the original publication of the generic name *Arachnodiscus* Bailey; other parts attribute this generic name, as proposed in this report, to Ehrenberg. The *International Code of Botanical Nomenclature* (Stafleu *et al.*, 1972, p. 245) lists the name *Arachnodiscus* Bailey *ex* Ehrenberg 1849, *op. cit.*, as a *nomen rejiciendum* and the name *Arachnoidiscus* Deane *ex* Pritchard 1852 as a *nomen conservandum*. However, Bailey's comments in the formal report of the Wilkes Exploring Expedition on pp. 174–75 [see 1862a] under *Arachnodiscus Ehrenbergii* B. indicates that he did not consider this his generic name but probably that of Deane, which was published in or before 1850.

**1849e** Bache, A. D. Report of the Superintendent of the Coast Survey, showing the progress of the work for the year ending November, 1849. *In* Meredith, M. W. Letter from the Secretary of the Treasury communicating the report of the Superintendent of the Coast Survey, showing the progress of that work during the year ending November, 1849. U.S. Senate Exec. Docums. vol. 5, no. 5 (31st Congress, 1st Session), serial no. 553. *Also:* U.S. House Exec. Docums. vol. 4, no. 14 (31st Congress, 1st Session), serial no. 572. [I have been unable to determine the actual publication dates of these reports, whether 1849 or 1850].

In this report under Section 8, "From Dauphin Island to Vermillion Bay, including the coast of Alabama, Mississippi, and part of Louisiana," on pages 52–53 Bache reports the results of Bailey's microscopic analysis of the sediments of Mobile Bay and vicinity. He indicates that the sediments from outside the Bay and coarse sandy sediments are the richest in microscopic organisms and that the species in this region differ from those of northern regions, except for the cosmopolitan ones.

**1850a** Discovery of an infusorial stratum in Florida. Am. J. Sci. Arts, ser. 2, **10**(29): 282.

A deposit of apparently Eocene infusoria is reported from near Tampa, Florida, which is older and disjunct from the previously known Tertiary deposits of Virginia and Maryland. Diatoms, sponge spicules, and other organisms are noted in the deposit.

**1850b** On a process for detecting the remains of infusoria, etc. in sedimentary deposits. Proc. Am. Assoc. Advmt. Sci. [2]:409. [For the year 1849.]

A flotation procedure is given for separating unbroken infusorial shells from associated silt and clay particles.

**1850c** Harvey, W. H. and J. W. Bailey. Descriptions of seventeen new species of algae, collected by the United States Exploring Expedition. Proc. Boston Soc. nat. Hist. 3:370–373. [See 1862a.]

**1851a** Reply to Mr. De la Rue's remarks on the *Navicula Spencerii* contained in the American Journal of Science, Vol. IX, p. 23; with a notice of two new test-objects. Am. J. Sci. Arts, ser. 2, **11**(31):82–84.

Bailey indicates that De La Rue now agrees with him that the lines in *Navicula spencerii* result from rows of prominences and not holes, and that their debate over the distance between the rows is possibly confounded by their use of different micrometers. *Navicula spencerii* is defended as a more difficult test-object than *N. hippocampus*, and two new ones are proposed: *Grammatophora subtilissima* and *N. amicii*.

**1851b–g** Miscellaneous notices. Am. J. Sci. Arts, ser. 2, **11**(31):85–86.

Six short notes on a heterogeneous array of topics are presented under this heading. Each is cited separately in this bibliography as 1851b, 1851c, . . . , 1851g.

**1851b** Fossil infusoria of the southern ricefields. Am. J. Sci. Arts, ser. 2, **11**(31):85.

A few localities in Carolina and Georgia that are particularly rich in marine and estuarine fossil diatoms are indicated. [See 1851b–g.]

**1851c** Localities of *Terpsinoë musica*, Ehr. Am. J. Sci. Arts, ser. 2, **11**(31):85.

This species is reported as common in Georgia, Carolina, and Florida and as occurring in southern rice fields, Jamaica, and the Philippines. [See 1851b–g.]

**1851d** Fossil infusoria of Maryland. Am. J. Sci. Arts, ser. 2, **11**(31):85–86.

Fossil infusorial strata are reported to reach across Chesapeake Bay to the eastern shore of Maryland and to contain the same characteristic diatoms as the previously known Maryland deposits. [See 1851b–g.]

**1851e** Silicified polythalamia in Florida. Am. J. Sci. Arts, ser. 2, **11**(31):86.

Polythalamia are reported in masses of flint associated with orbitulite limestone near Pitalka, Florida. [See 1851b–g.]

**1851f** Localities of *Paludicella articulata*, Allman. Am. J. Sci. Arts, ser. 2, **11**(31):86.

Some habits, habitats, and locations in New York of a bryozoan polyp are noted briefly. [See 1851b–g.]

**1851g** Circulation in *Hydrocharis spongiosa*. Am. J. Sci. Arts, ser. 2, **11**(31):86.

The epidermal hairs of this plant are reported to afford microscopists an excellent opportunity to observe moving cytoplasm. [See 1851b–g.]

**1851h–m** Miscellaneous notices. Am. J. Sci. Arts, ser. 2, **11**(33):349–352.

These five short notices examine different subjects. Each is cited separately in this bibliography as 1851h, 1851i, . . . , 1851m.

**1851h** On the real nature of the so-called "orifices" in diatomaceous shells. Am. J. Sci. Arts, ser. 2, **11**(33):349–350.

Bailey demonstrates by a time-lapse dissolution of the silica cell wall of several different diatoms that the "apertures," "orifices," and

"mouths" of other authors are, in fact, the thickest parts of the frustule, that is, nodules and not holes. [See 1851h–m.]

**1851i** On the cell-membrane of diatomaceous shells. Am. J. Sci. Arts, ser. 2, **11**(33): 350–351.

Hydroflouric acid treatment of diatoms is used to demonstrate distinct, internal, flexible cell membranes which retain the general form of the shell. Bailey indicates that these membranes are a source of optical interference when the markings on the siliceous shell are examined and so should be destroyed by an acid oxidation. He notes also that diatoms from different localities have different degrees of resistance to dissolution by HF. [See 1851h–m.]

**1851j** Mode of distinguishing artificial from natural camphor. Am. J. Sci. Arts, ser. 2, **11**(33):351.

A qualitative, colorimetric assay for camphor crystals using polarized light is reported. [See 1851h–m.]

**1851k** Infusoria in Hudson River ice. Am. J. Sci. Arts, ser. 2, **11**(33): 351.

A few species of diatoms common to the mud of the river bottom are reported from drift ice. [See 1851h–m.]

**1851m** On the detection of sulphur. Am. J. Sci. Arts, ser. 2, **11**(33):351–352. *Also:* Justus Leibigs Annln. Chem. **81**:180–181 (1852). [This is not a reprint of the original article but an account of it not authored by Bailey.]

A qualitative colorimetric assay based on Playfair's prussic acid salt is described. [See 1851h–m.]

**1851n** [Bailey, J. W.] On the infusoria and other microscopic forms in dust-showers and blood-rain; by C. G. Ehrenberg. Am. J. Sci. Arts, ser. 2, **11**(33):372–389, 1 *pl.*

DeToni (1891, p. x) and Pelletan (1891, p. 300) attribute the translation of this article to J. W. Bailey; however, there is no evidence within the confines of the article or in the specific volume's "Table of Contents," "Index" or in the journal's cumulative index indicating Bailey as either the translator or the author. The article is only partially a translation; primarily it is a summarized account of a particular Ehrenberg work. Evidence that Bailey was the author has been found in the reprint of this article contained in the W. G. Farlow collection of Bailey's papers, housed in the Farlow Herbarium under the reference number B1547 Rare. This reprint contains on the first page the truncated phrases "From the autho/with his high r/." The handwriting is Bailey's and can be compared with other examples of it, such as that on a copy of his "American Bacillaria" that was signed by him and is in the Farlow Herbarium under reference number B1547ab. Although an apparently collective "we" is used in the last paragraph of the account, Bailey used this pronoun on occasion when it is clear that he was the sole author [see 1845b and 1847b].

This summary presents a detailed description and tabular account of the infusoria occurring in several Atlantic, African, and European

dust showers and rains between 1803 and 1849. A single plate illustrates many infusoria from a Lyon dust shower.

**1851o** Microscopical examination of soundings, made by the U.S. Coast Survey off the Atlantic Coast of the U.S. (Smithsonian Institution Publication no. 20). Smithson. Contr. Knowl. **2**(3):1–15, 1 *pl. Also:* Am. J. Sci. Arts, ser. 2, **12**(34):132–133. *Also:* Edinb. New phil. J. **51**:359–361. *Also:* Edinb. New phil. J. **54**:142–144 (1853). [Title: General results of the microscopical examination of soundings, made by the U.S. Coast Survey off the Atlantic Coast of the United States.]

[Each of the above reprint citations refers to an article where only the ten points made in the "General Results of Examination" section of the original article (pp. 7–9) are related.]

The examination of 16 soundings, ranging from 10 to 105 fathoms, between Montauk Point, New York and Cape Henlopen, Delaware indicates a preponderance of polythalamia, which are qualitatively similar among all deeper soundings, but with different dominant forms characterizing different locations. Differences between shallow and deepwater forms of polythalamia, siliceous infusoria, and minerals are noted along with the effect of the Gulf Stream on the deposits. Taxonomic emphasis is given to identification of the polythalamia with the description of 11 new taxa; lesser attention is paid to the diatoms but a single new species is presented.

**1851p** Microscopical observations made in South Carolina, Georgia, and Florida. (Smithsonian Institution Publication no. 23). Smithson. Contr. Knowl. 2(8):1–48, *pl.* 1–3.

As a result of his tour as an invalid during 1849–1850 through numerous localities in the southern coastal states, Bailey reports 275 species of diatoms, desmids and other infusoria and algae from fossil and Recent, freshwater and saltwater habitats. Three extensive tables compare their distributions in the South and in New York and Rhode Island. This southern flora is also compared with that of Europe. Numerous new taxa are described: diatoms (16 spp.), desmids (16 spp. and 1 gen.) and other infusoria or algae (7 spp.). An extensive fossil infusorial stratum is reported from Florida. Vast quantities of infusoria are found in salt marsh formations and rice fields indicating "the former presence of salt water much farther up the coast than it now extends." An appendix entitled "Microscopical Forms found near Salem, Mass., by T. Cole, Esq.," lists more than 100 species of algae, protozoa and other microorganisms.

**1853a** [Review of] A history of infusorial animalcules, living and fossil, illustrated by several hundred magnified representations: by Andrew Pritchard, M. R. I., etc. A new edition, enlarged. London. 1852. Am. J. Sci. Arts, ser. 2, **15**(44):299–300.

In a brief, yet critical, review of the book, Bailey points out the generally poor arrangement of the assembled materials, the errors in knowledge of the characteristics of the diatom cell, and the obsolescence of many of the generic and species descriptions of Ehrenberg and Kützing.

**1853b** Observations on a newly discovered animalcule. Am. J. Sci. Arts, ser. 2, **15**(45): 341–347, *fig.* 1–10. *Also:* Q. J. microsc. Sci. **1**(4):295–299. [Title: On a new animalcule.] [No figures are included in this reprint, and as a consequence, the article has been altered slightly to accommodate the fact.]

Bailey reports in detail on the anatomy, morphology, and reproductive and feeding behavior of a rhizopodous protozoan, *Pamphagus mutabilis, n. gen. et n. sp.*

**1853c** Harvey, W. H. and J. W. Bailey. New species of Diatomaceae, collected under the United States Exploring Expedition, under the command of Capt. Wilkes, U.S.N. Proc. Acad. nat. Sci. Phila. **6**:430–431. *Also:* Q. J. microsc. Sci. **3**(9):93–94 (1854). [Title: New species of Diatomaceae.] [See 1862a.]

**1853d** List of Diatomaceae, collected by the United States Exploring Expedition under Capt. Wilkes, U.S.N. Proc. Acad. nat. Sci. Phila. **6**:431–432. *Also:* Q. J. microsc. Sci. **2**(8):288–290. [Title: List of Diatomaceae.] [See 1862a.]

**1854a** Examination of some deep soundings from the Atlantic Ocean. Am. J. Sci. Arts, ser. 2, **17**(50):176–178. *Also:* Q. J. microsc. Sci. **3**(9):89–91. [Title: Microscopical examination of some deep soundings from the Atlantic Ocean.] [This reprint omits the first four paragraphs of the original article, but otherwise it is the same.]

The analysis of soundings taken by the *U.S. Brig Dolphin*, under Lt. Berryman, from depths ranging from 1080 to 2000 fathoms between Montauk Point, New York and Cape Henlopen, Delaware, revealed mostly deepwater, foraminiferal shells and little mineral matter. These soundings were taken in much deeper water than those previously reported from this area [see 1851o]. All samples contained pelagic diatoms, polycistines, and sponge spicules, and in general, resembled the chalk of England and the calcareous marls of the Upper Missouri, which Bailey concluded were deep-sea deposits also. He viewed much of the North Atlantic Ocean floor as a mass of microscopic shells. His inability to find species alive in the surface waters above where he had found them deposited led him to speculate on both autochthonous and allochthonous origins of these deposits.

**1854b** On some new localities of fossil Diatomaceae in California and Oregon. Am. J. Sci. Arts, ser. 2, **17**(50):179–180. *Also:* Q. J. microsc. Sci. **3**(9):91–92. [Title: On some new localities of fossil Diatomaceae.]

Marine and freshwater fossil diatom deposits from Suisan Bay, California and the Pit River, Oregon, and some unspecified localities are characterized briefly, but little indication is given of the kinds of diatoms present in them. Some comparisons are made with other diatom deposits.

**1854c** On a mode of giving permanent flexibility to brittle specimens in botany and zoology. Am. J. Sci. Arts, ser. 2, **18**(52):100–102. *Also:* Ann. Mag. nat. Hist., ser. 2, **14**(83):373–375.

Impregnation of brittle, especially lime-secreting, algae with calcium chloride results in specimens remaining flexible for long periods of time while stored in herbaria.

**1854d–q** Notes of new species and localities of microscopical organisms. (Smithsonian

Institution Publication no. 63.) Smithson. Contr. Knowl. 7(3):1–16, *pl.* 1 and *fig.* 1–4. [This article was accepted for publication in November, 1853, but published in February, 1854. The completed volume 7 was published in 1855.]

Thirteen short, largely independent, notes are assembled in this article. Each is cited separately in this bibliography as 1854d, 1854e, . . . , 1854q.

**1854d** Fossil marine Diatomaceae in California. Smithson. Contr. Knowl. 7(3):3, *pl.* 1, *fig.* 1–2.

The first fossil deposit of marine diatoms from the west coast of North America is reported from Suisan Bay, California. This deposit is similar to the "infusorial strata" of Virginia and Maryland. Several species of diatoms are identified. [See 1854d–q.]

**1854e** New species of *Limnias*. Smithson. Contr. Knowl. 7(3):4, *pl.* 1, *fig.* 28.

A new species of a freshwater, epiphytic, tubiculous rotifer is reported. [See 1854d–q.]

**1854f** New species of Ehrenberg's genus *Auliscus*. Smithson. Contr. Knowl. 7(3):4–6, *pl.* 1, *fig.* 3–9, 13.

Bailey "corrects" Ehrenberg's characterization of the genus *Auliscus* and describes four new species in it. [See 1854d–q.]

**1854g** American locality of *Amphitetras antediluviana* Ehr. Smithson. Contr. Knowl. 7(3):6–7, *pl.* 1, *fig.* 21.

The rare *Amphitetras antediluviana* is reported from Edgartown Harbor, Massachusetts along with nine other species of diatoms. The abundance of polythalamia in the harbor soundings strikes Bailey as peculiar in view of the "northern coast" location of the collections. [See 1854d–q.]

**1854h** American localities of *Tetragramma*. Smithson. Contr. Knowl. 7(3):7–8, *fig.* 1–2.

A new species, *Tetragramma americana*, is described from the American Atlantic coast. [See 1854d–q.]

**1854i** New species of Diatomaceae. Smithson. Contr. Knowl. 7(3):8–11, *pl.* 1, *fig.* 10–12, 14–17, 19–20, 22–24, 29–32, 38 and text *fig.* 3.

Fourteen species of marine and freshwater, fossil and Recent diatoms are described in detail. Many are from Halifax, Nova Scotia. [See 1854d–q.]

**1854j** On the microscopic forms found in the Croton water in New York City. Smithson. Contr. Knowl. 7(3):11–12.

Twenty species of diatoms, sixteen species of green algae, and a few infusoria and crustaceans are reported from filtered New York City drinking water. [See 1854d–q.]

**1854k** Two new species of the genus *Peridinium*. Smithson. Contr. Knowl. 7(3):12–13, *pl.* 1, *fig.* 4, 33–35.

*Peridinium longipes* and *P. depressum* are described from Georges Bank in the North Atlantic Ocean. Also, the possibility that some

forms "now included in the genus *Peridinium*, may be imperfectly developed, or embryonic Annelids" is discussed. [See 1854d–q.]

**1854m** New species of the genus *Cothurnia*? Smithson. Contr. Knowl. **7**(3):13, *pl.* 1, *fig.* 27.

The empty lorica of a peritrichous ciliate is described. [See 1854d–q.]

**1854n** American species of the genus *Monactinus*. Smithson. Contr. Knowl. **7**(3):14, *pl.* 1, *fig.* 36–37.

Two new species of colonial green algae are described from Croton water in New York. [See 1854d–q.]

**1854o** On some new test objects. Smithson. Contr. Knowl. **7**(3):14, *pl.* 1, *fig.* 12.

*Hyalodiscus subtilis* and *Grammatophora stricta* are discussed as microscopic, resolution test-objects. [See 1854d–q.]

**1854p** Marine Diatomaceae of Halifax, Nova Scotia. Smithson. Contr. Knowl. **7**(3):15.

Twenty-three species of diatoms and two species of silicoflagellates are listed from Halifax Harbor. [See 1854d–q.]

**1854q** New genus of Diatomaceae. Smithson. Contr. Knowl. **7**(3):15, *pl.* 1, *fig.* 24–25.

*Toxarium undulatum, n. gen. et n. sp.*, is described. [See 1854d–q.]

**1854r** Lee, S. P. List of specimens of the bottom, pp. 327–328. *In* Lee, S. P. Report and charts of the *U.S. Brig Dolphin*, made under direction of the Navy Department. U.S. Senate Exec. Docums. vol. 9, no. 59 (33rd Congress, 1st Session), serial no. 699.

Meisel (1929, vol. 3, p. 133) attributes this list to J. W. Bailey. It characterizes primarily the color of the bottom mud; no organisms are reported. On page 2 of the above report under "Notes" an explanation of the list is given: "The specimens of bottom off the Amazon, etc. (see list, pp. 327, 328) have been submitted to Professor Bailey, of West Point, for examination, who has already made some interesting discoveries in them; but the investigation is not yet finished." The results of this investigation by J. W. Bailey were later published by his son, Loring W. Bailey [see 1861a]. There is no evidence that J. W. Bailey composed the list.

**1855a** Reply to some remarks by W. H. Wenham, and notice of a new locality of a microscopic test-object. Am. J. Sci. Arts, ser. 2, **19**(55):28–30.

Bailey responds to Wenham's inability to resolve various microscopic objects by explaining the effect of dry-versus-balsam mounting of materials on their resolution and the effect of numerical aperture on resolution. He announces also the use of the shells of *Hyalodiscus* as a new resolution test-object.

**1855b** On a universal indicator for microscopes. Am. J. Sci. Arts, ser. 2, **20**(58):58–65, *pl.* 1.

The construction and use of a transferable microscope-stage indicator for locating individual specimens are described in detail.

This indicator has the advantage over other "locators" because its coordinates are transferable to any microscope.

**1855c** Letter from Professor J. W. Bailey [dated 14 December 1854] upon infusorial fossils submitted to him by Dr. Schiel, pp. 135–136. *In* Beckwith, E. G. Report of explorations for the Pacific Railroad on the line of the forty-first parallel of north latitude (1854). *In* Report of the Secretary of War communicating the several Pacific Railroad Expeditions. U.S. House Exec. Docums. vol. 18, pt. 2, no. 129 (33rd Congress, 1st Session), serial no. 737. *Also: in* Beckwith, E. G. Report of explorations for a route for the Pacific Railroad on the line of the forty-first parallel of north latitude, pp. 111–112, *Geol. pl.* 3, *fig.* 1–7 (1854). *In* Reports of explorations and surveys, to ascertain the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean. Made under the direction of the Secretary of War in 1853–1854, according to the acts of Congress of March 3, 1853, May 31, 1854 and August 5, 1854 (1855). U.S. Senate Exec. Docums. vol. 13, pt. 2, no. 78 (33rd Congress, 2nd Session), serial no. 759. *Also:* U.S. House Exec. Docums. vol. 11, pt. 2, no. 91 (33rd Congress, 2nd Session), serial no. 792 (1856). [This version is identical to that in serial no. 759.]

A letter to Lt. E. G. Beckwith lists primarily the diatoms from two freshwater California localities and describes two new species: *Cymbella gibba* and *Cymatopleura campylodiscus*. These diatom species were later described also by L.W. Bailey as new, in ignorance of this original publication [see 1861a]. In the original publication of this letter in serial no. 737 there were no figures of the diatoms; in both later reprints of the letter, serial nos. 759 and 792, the figures were included.

**1855d** [Portion of a letter from J. W. Bailey to M. F. Maury dated November, 1853, on soundings brought up by Brooke's lead from the Telegraphic Plateau in the North Atlantic Ocean.] pp. 210–211. *In* Maury, M. F. *The Physical Geography of the Sea* ed. 1. Harper & Bros., N.Y. [See Williams, 1963, p. 698, for subsequent editions.]

Bailey records here his idea that the microscopic shells of foraminifera and diatoms, found composing the oceanic floor sediments, are derived from the organisms living at the surface, which sink to the depths after dying. This idea is contrary to Ehrenberg's which postulated an autochthonous origin for the sediments.

**1856a** Remarks on Mr. Wenham's paper on aperture of object glasses. Am. J. Sci. Arts, ser. 2, **21**(61):105–106. *Also:* Q. J. microsc. Sci. **4**(14):160–162. [This version is slightly abbreviated but yet substantially the same in information content as the original article. It was communicated directly to the Q. J. microsc. Sci. by Bailey.]

At the outset Bailey indicates that Wenham has withdrawn his criticism of Bailey's previously published observations on the resolving ability of microscopes. He proceeds to discuss divergent rays, refractive interfaces, and numerical aperture in relation to resolution.

**1856b** On some specimens of deep sea bottom, from the sea of Kamtschatka, collected by Lieut. Brooke, U.S.N. [Copy of a letter dated 29 January 1856 from J. W. Bailey to Lieut. M. F. Maury.] Am. J. Sci. Arts, ser. 2, **21**(62):284–285. *Also:* Q. J. microsc. Sci. 4(16):305–306. *Also: in* Maury, M. F. *The Physical Geography of the Sea,* ed. 6. Harper & Bros., N.Y. 1856. pp. 263–264. [See Williams, 1963, p. 698, for subsequent editions.]

Three samples from different depths in the Sea of Kamtschatka (=Bering Sea) indicate that the amount of mineral matter decreases and the amount of organic matter increases with increases in depth. All samples are rich in diatoms and contain also siliceous sponge spicules and polycistines, but no calcareous polythalamia. These deposits are contrasted with those of the Atlantic soundings but are shown to be similar to those Ehrenberg reported from Antarctica. Based on his observations of littoral "epiphytes" in the Kamtschatkan deposits, he postulates, in contrast to Ehrenberg, an allochthonous origin for the organisms in the deposits.

**1856c** New method of disintegrating masses of fossil Diatomaceae. Am. J. Sci. Arts, ser. 2, **21**(63):356–357. *Also:* Q. J. microsc. Sci. **4**(16):302–303.

For breaking up heavily siliceous deposits the use of sodium or potassium hydroxide is recommended, and directions are provided.

**1856d** On the non-existence of polarizing silica in the organic kingdoms. Am. J. Sci. Arts, ser. 2, **21**(63):357–358. *Also:* Q. J. microsc. Sci. **4**(16):303–305. *Also:* Ann. Mag. nat. Hist., ser. 2, **18**(103):78–79.

The previous reports of polarizing silica are reviewed briefly, especially those concerning the cuticle of *Equisetum*. Bailey contends that the phenomenon of polarizing silica in organisms is the result of the contamination of the silica by the carbonaceous matter below it, and that if the carbon is removed, then the silica will not polarize light. His observations in lower plants and diatoms are consistent with this idea.

**1856e** Notice of microscopic forms found in the soundings of the Sea of Kamtschatka —with a plate. Am. J. Sci. Arts, ser. 2, **22**(64):1–6, *pl.* 1. [See errata for this volume—vol. 22, p. viii.]

Many species of diatoms, polycistines, and rhizopodous protozoans are reported from the bottom of the Sea of Kamtschatka (=Bering Sea). Several new species of each group are described including a new rhizopod genus, *Cadium*.

**1856f** On the origin of greensand, and its formation in the oceans of the present epoch. Proc. Boston Soc. nat. Hist. **5**:364–368. *Also:* Am. J. Sci. Arts, ser. 2, **22**(65):280–284. *Also:* Ann. Mag. nat. Hist. ser. 2, **18**(107):425–428. *Also:* Q. J. microsc. Sci. **5**(18):83–87 (1857). [This reprint was communicated directly by the author to the journal.]

The idea that greensand (=glauconite) is formed by the gradual filling of the interior spaces of minute organisms, such as foraminiferans, with a siliceous cast, is credited by Bailey to Ehrenberg, but Bailey discusses several locations in North America where both the casts and the greensand co-occur. His primary point, which he supports with his observations from the Gulf Stream and the Gulf of Mexico, is that greensand or cast formation is going on at the present time in the oceans.

**1856g** Letter from Professor J. W. Bailey, U.S. Military Academy at West Point,

relative to characteristics deducible from specimens of bottom, brought up in sounding Florida sections of the Gulf Stream [dated 16 October 1855 to Prof. A. D. Bache]. App. no. 55, p. 360. *In* Bache, A. D. Report of the Superintendent of the Coast Survey showing the progress of the survey during the year 1855. U.S. Senate Exec. Docums. vol. 17, no. 22 (34th Congress, 1st Session), serial no. 826. *Also:* U.S. House Exec. Docums. vol. 3, no. 6 (34th Congress, 1st Session), serial no. 845.

Samples from soundings taken near Key Biscayne, Florida, were composed primarily of foraminifera, diatoms, and sponge spicules. In that the diatoms were littoral forms, Bailey discusses the possible transport mechanisms which could get them into the Gulf Stream beds, and he compares the origin of these deposits with those described by Ehrenberg from Barbados. Some foraminifera, but no diatoms, were identified.

**1856h** [Letter from J. W. Bailey to Lieut. M. F. Maury dated 14 November 1856, on the "results of . . . microscopic examination of the soundings made by Lieut. O. H. Berryman on his recent voyage in the United States steamer *Arctic* to Ireland and Back."] pp. 469–472. *In* Dobbin, J. C. Report of the Secretary of the Navy, pp. 405–762. *In* Message from the President of the United States to the two houses of Congress, at the commencement of the third session of the thirty-fourth Congress. U.S. Senate Exec. Docums. vol. 3, pt. 2, no. 5 (34th Congress, 3rd Session), serial no. 876. *Also:* U.S. House Exec. Docums. vol. 1, pt. 2, no. 1 (34th Congress, 3rd Session), serial no. 894. *Also:* Am. J. Sci. Arts, ser. 2, **23**(68): 153–157 (1857). [Title: Report upon the results of microscopic examinations of the soundings made by Lieut. Berryman, of the U.S. Navy, on his recent voyages to and from Ireland in the "Arctic."]

Most of the samples derived from these soundings were in, or adjacent to, the Gulf Stream. From them Bailey concluded that the mineral matter showed no signs of abrasion and thus was deposited gently and that there is an increase in calcareous matter as the Gulf Stream is approached and it predominates in it across most of the North Atlantic. The presence of diatoms, foraminifera, other infusoria, and greensand casts is noted. The origin of volcanic ashes, which were observed in several samples, remained a mystery to Bailey.

**1856i** [Portion of a letter from J. W. Bailey to M. F. Maury dated 1855, on microscopic specimens from the Coral Sea sediments collected by Brooke's North Pacific Exploring Expedition.] pp. 261–263. *In* Maury, M. F. *The Physical Geography of the Sea,* ed. 6, Harper & Bros., N.Y. [See Williams, 1963, p. 698, for subsequent editions.]

Bailey reports that sediments from 2150 fathoms are composed primarily of siliceous sponge spicules, but some diatom shells are present. The paucity of foraminiferan shells in the sediments causes Bailey to contrast the predominantly siliceous sediments of this Pacific region with the characteristically calcareous ones of the North Atlantic.

**1856j** Smith, Wm. *Synopsis of the British Diatomaceae.* Vol. 2. J. van Voorst, London, 107 pp., *pl.* 32–60, *suppl. pl.* 61–62, *pl.* A–E.

On page 101 of this volume a new generic name is proposed, and Bailey is cited as its author: "*Podocystis* Bail. Nov. Gen." The only

species listed by Smith in this new genus was *P. americana* Bailey, derived from Bailey's Smithsonian paper on microscopical organisms [see 1854i]. Bailey was well aware of the 1844 work in which this generic name was first proposed by Kützing, and there is no indication whatsoever in his literature that he considered it his name. Smith's attribution of this name to Bailey is in error.

**1857a** Letter from Professor J. W. Bailey [to W. P. Blake dated 22 March 1855] describing the structure of the fossil plant from Posuncula River. App. art. 4, p. 337, *Geol. pl.* 1, *fig.* 1–2. *In* Blake, W. P. Part 2, Geological report. *In* Williamson, R. S. Report of the explorations in California for railroad routes, to connect with the routes near the 35th and 32nd parallels of north latitude (1853). *In* Reports of explorations and surveys, to ascertain the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean made under the direction of the Secretary of War, in 1853–1854, according to Acts of Congress of March 3, 1853, May 31, 1854, and August 5, 1854 (1856). U.S. Senate Exec. Docums. vol. 15, pt. 5, no. 78 (33rd Congress, 2nd Session), serial no. 672. *Also:* U.S. House Exec. Docums. vol. 11, pt. 5, no. 91 (33rd Congress, 2nd Session), serial no. 795.

Notes and sketches are presented of an unknown fossil of a vascular plant. The fossil plant was collected from a river bed in southern California.

**1857b** Description of fossil microscopic organisms, from Monterey. App. art. 8 [scheduled]. No pages. *Also in:* Blake, W. B.; Williamson, R. S.; Reports of explorations and surveys; U.S. House Exec. Docums.; for all see 1857a.

A note in Blake's report reads "Article VIII was not received in time for publication with the other portion of this report." It is clear from the "Catalogue of the Bailey Microscopical Collection" at the Farlow Herbarium that Bailey analyzed samples from this expedition taken in the Monterey and Tulare Lakes region of California and that he identified many diatoms. Apparently, however, he died before a manuscript of the results could be completed, and consequently, article 8 was never published.

**1857c** [Letter dated 2 April 1856 from J. W. Bailey to Maj. W. H. Emory, concerning fossil polythalamia and greensand casts from West Texas.] pt. 2, p. 24. *In* Emory, W. H. Report of the United States and Mexican Boundary Survey, made under the direction of the Secretary of the Interior. U.S. Senate Exec. Docums. vol. 20, pt. 1, no. 108 (34th Congress, 1st Session), serial no. 832. *Also: In* Emory, W. H. United States and Mexican Boundary Survey. Report of William H. Emory. U.S. House Exec. Docums. vol. 14, pt. 1, no. 135 (34th Congress, 1st Session), serial no. 861.

Fossil polythalamia and greensand casts are reported from Cretaceous strata, and travertine-like crusts containing encrusting blue-green algae are described from West Texas.

**1861a** Bailey, Loring Woart. Notes on new species of microscopical organisms, chiefly from the Para River, South America. Boston J. nat. Hist. 7:329–352, *pl.* 7–8.

These notes contain descriptions and lists of diatoms, primarily from collections made by Lee's *Dolphin* Expedition off the coast of South America [see 1854r], but they include also a few observations

on diatoms collected from the Gulf Stream and redescriptions of two "new" species previously described by J. W. Bailey from California [see 1855c]. L. W. Bailey completed these analyses and descriptions following the death of his father, J. W. Bailey. The "Catalogue of the Bailey Microscopical Collection" in the Farlow Herbarium shows clearly, by both notations and handwriting, that both Baileys examined and identified diatoms from the Para River material. Several new genera and species are described in these notes, some clearly those of J. W. Bailey (indicated as "*Bail.*" or "*B.*") and others those of L. W. Bailey (indicated as "*L. W. B.*").

**1861b** Pritchard, Andrew. A history of the infusoria, living and fossil, arranged according to "Die Infusionsthierchen" of C. G. Ehrenberg; containing colored engravings, illustrative of all the genera, and descriptions of all the species in that work, with several new ones; to which is appended an account of those recently discovered in the chalk formations. ed. 4. Revised and enlarged by J. T. Arlidge, W. Archer, J. Ralfs, W. C. Williamson and the author. Whittaker & Co., London. xii + 968 pp., 40 *pl.*

Several generic and specific names of diatoms, apparently derived from a J. W. Bailey manuscript, were published by Ralfs in this edition and attributed to Bailey.

**1862a** Bailey, J. W. and W. H. Harvey. Algae, pp. 153–192, *pl.* 1–9. *In* [Gray, A., ed.] vol. 17. Botany. I. Lower Cryptogamia. II. Phanaerogamia of the Pacific Coast of North America, 1862–1874. *In* United States Exploring Expedition during the years 1838–1842, under the command of Charles Wilkes, U.S.N. 1844–1874. [For clarification of the dates of publication and authorship of this part of the Wilkes Expedition's results, see Collins, 1912]. *Also:* Harvey, W. H. and J. W. Bailey. Descriptions of seventeen new species of algae, collected by the United States Exploring Expedition. Proc. Boston Soc. nat. Hist. **3**:370–373 (1850). [Only the Latin descriptions of the 17 new taxa of seaweeds are presented; no discussions or illustrations are included.] *Also:* Harvey, W. H. and J. W. Bailey. New species of Diatomaceae, collected under the United States Exploring Expedition, under the command of Capt. Wilkes, U.S.N. Proc. Acad. nat. Sci. Phila. **6**:430–431 (1853). [The Latin descriptions of the new species of diatoms are presented only; neither discussions nor illustrations are included.] *Also:* Harvey, W. H. and J. W. Bailey. New species of Diatomaceae. Q. J. microsc. Sci. **3**(9):93–94 (1854). [This is a reprint of the article in Proc. Acad. nat. Sci. Phila. **6**:430–431 (1853).] *Also:* Bailey, J. W. List of Diatomaceae, collected by the United States Exploring Expedition under Capt. Wilkes, U.S.N. Proc. Acad. nat. Sci. Phila. **6**:431–432 (1853). [About 50 species of diatoms and a few of non-diatomaceous infusoria are listed by locality. No descriptions or notes are included.] *Also:* Bailey, J. W. List of Diatomaceae. Q. J. microsc. Sci. **2**(8):288–290 (1853). [This is a reprint of the article in Proc. Acad. nat. Sci. Phila. 6:431–432 (1853).]

This long-delayed publication consists of two parts: (a) the "Algae," covering pages 155–173 and plates 1–8; and (b) the "Diatomaceae and other microscopic forms," covering pages 174–182 and plate 9. New taxa in each part are introduced, with Latin descriptions, and are discussed and illustrated. The distributions of these new species, and of many already established species, are presented according to the various localities visited by the Exploring Expedition, including the Cape Verde Islands, Madeira, Cape Horn, Tierra del Fuego, Rio de

Janiero, Valparaiso, Puget Sound, the Philippines, the Sulu Sea, New Zealand and several South Pacific islands.

**1885a** Chase, H. H., ed. *Habirshaw's Catalogue of the Diatomaceae* [ed. 3] H. H. Chase, Geneva, N.Y. 354 pp.

Several generic and specific names of diatoms attributed to J. W. Bailey, which were apparently derived from the "Catalogue of the Bailey Microscopical Collection" or from unpublished manuscripts, have entered the literature via Habirshaw's *Catalogue*. The status of these names is yet to be fully determined.

**1892a** Bailey, William W., ed. An extract from the diary of Professor J. W. Bailey. Bull. Torrey bot. Club **19**:271–272.

This excerpt from Jacob Whitman Bailey's diary was dated 21 May 1835 and recalls Bailey's first meeting and early botanizing with John Torrey in New York.

**1894a** Bailey, Loring W. *The St. John River in Maine, Quebec, and New Brunswick*. Riverside Press, Cambridge. 178 pp.

*The National Union Catalog, Pre-1956 Imprints*, vol. 30, p. 553 (Library of Congress and American Library Association, 1969) mistakenly attributes this book to Jacob Whitman Bailey. It was, in fact, authored by his son, L. W. Bailey, nearly 40 years after his father's death.

## LITERATURE CITED


Chase, H. H., ed. 1885. Habirshaw's catalogue of the Diatomaceae. [ed. 3]. H. H. Chase, Geneva, N.Y. 354 pp.

Collins, F. S. 1912. The botanical and other papers of the Wilkes Exploring Expedition. Rhodora **14**(160):57–68.

DeToni, G. B. 1891. Sylloge algarum omnium hucusque cognitarum. vol. 2. Bacillariae. sect. 1. Rhaphideae. 490 pp.

Library of Congress and American Library Association, eds. 1969. The national union catalog, pre-1956 imprints. vol. 30. Mansell, London.

Meisel, M. 1929. A bibliography of American natural history. Pioneer century. 1769–1865. 3 vol. Premier Publ. Co., N.Y.

Mills, F. W. 1933. An index to the genera and species of the Diatomaceae and their synonyms. 1816–1932. vol. 1. pt. 1. Wheldon & Wesley, London. pp. 1–50.

Pelletan, J. 1891. Les diatomées. Histoire naturelle, preparation classification and description des principales espèces. J.–B. Bailliere et fils, Paris. 364 pp., 5 pl., 265 fig.

Royal Society of London. 1867. Catalogue of scientific papers (1800–1863). vol. 1. C. J. Clay & Sons, London. pp. 1–960.

————————. 1891. Catalogue of scientific papers (1874–1883). vol. 9. C. J. Clay & Sons, London. pp. 1–1016.

Stafleu, F. A., C. E. B. Bonner, R. McVaugh, R. D. Meikle, R. C. Rollins, R. Ross, J. M. Schopf, G. M. Schulze, R. de Vilmorin and E. G. Voss, eds. 1972. International code of botanical nomenclature. International Bureau of Plant Taxonomy and Nomenclature, Utrecht. 426 pp.

VanLandingham, S. L. 1967–1975. Catalogue of the fossil and recent genera and species of diatoms and their synonyms. vol. 1–5. J. Cramer, Lehre. pp. 1–2963.

Williams, F. L. 1963. Matthew Fontaine Maury. Scientist of the sea. Rutgers University Press, New Brunswick, N.J.

# A NOTE ON PHAEOFABRAEA AND ITS PLACEMENT IN THE LEOTIACEAE SUBFAMILY ENCOELIOIDEAE (DISCOMYCETES)

Donald H. Pfister[1]

Since its origin, the small Discomycete genus *Phaeofabraea* Rehm has been treated in the Dermateaceae. Its placement in this family was based on its possession of dark brownish-black globose cells in the ectal excipulum. For reasons detailed below, the genus is reassigned to the Leotiaceae subfamily Encoelioideae. Two species are placed in this genus. A brief generic description follows with comment on the assigned species.

**Phaeofabraea** Rehm

*Phaeofabraea* Rehm, Ann. Mycol. 7:541. 1909.
= *Perizomatium* Syd., Ann. Mycol. 25:98. 1927.

Apothecia small to minute, solitary or in groups on stromata of foliicolous Ascomycetes. Hymenium brownish to black. Apothecial margin exposed, downy or furfuraceous, whitish or brownish. Medullary excipulum of textura intricata, hyaline. The hyphae in this zone are sometimes encrusted with refractive granules and/or crystals. Ectal excipulum of textura angularis to textura globulosa, dark brown to black. Asci subcylindrical, thick-walled when young, 8-spored, J-, inoperculate, unitunicate. Spores ellipsoid, rarely slightly allentoid, unicellular, dark brown except for a hyaline band circling the spore latitudinally.

TYPE SPECIES: *Phaeofabraea miconiae* Rehm (only original species).

KEY TO THE INCLUDED SPECIES OF *Phaeofabraea*

A. Ascospores 7–9(–10) × 4–5 μm, cortical cells of the apothecium dark brown to almost black, apothetical margin tending to brownish. ..... *P. lachnoides.*
A′. Ascospores 11–14(–16) × 6–8 μm, cortical cells of apothecium yellowish-brown, apothecial margin whitish. ..... *P. miconiae.*

**Phaeofabraea lachnoides** (Rehm) Pfist. comb. nov.

≡ *Cenangella lachnoides* Rehm *in* Rabenhorst-Pazschke, Fungi europaei et extraeuropaei, no. 4170. 1898. — *Phaeangella lachnoides* (Rehm) P. Hennings, Hedwigia 43:91. 1904. = *Perizomatium lachnoides* (Rehm) Syd., Ann. Mycol. 25:98. 1927.
= *Phaeangella socia* P. Hennings, Hedwigia 43:271. 1904.
= *Phaeofabraea parahybensis* Batista, Machado, & Maia, Univ. Recife Inst. Micologia Public. 302:5. 1961.

[1]The Farlow Reference Library and Herbarium of Cryptogamic Botany, Harvard University, Cambridge, Massachusetts 02138, U.S.A.

The descriptions by Rehm (1900) and Sydow (1927) accurately detail the macroscopic and microscopic characteristics of this species. Sydow first reported that the ascospores were unicellular rather than one-septate. Sydow also discussed the imperfect stage which he named *Perizomella*. This member of the Sphaeropsidales has conidia which, like the ascospores, have a median hyaline band. I differ with Batista, Machado, and Maia (1962) who considered the asci of *Phaeofabraea paralybensis*, here considered a synonym, to be bitunicate. Though the asci are thick-walled, particularly when young, I have seen evidence of neither two-layered wall construction nor elaborated apex configurations.

*Cenangella lachnoides* was made the type of *Perizomatium* Sydow (1927). In an apparent *lapsis calimus* Batra (1968) has listed "*Phaeofabraea lachnoides* (Rehm) Sydow." This combination cannot be found anywhere in Sydow's paper.

CRITICAL SPECIMENS EXAMINED. **Brazil:** In fol. *Ocoteae* spec., São Francisco, April 1894, *E. Ule*, number 4170 in Rabenhorst-Pazschke, Fungi europaei et extraeuropaei (FH—here designated lectotype); Rio de Janeiro, Nictheroy, in *Ocoteae* sp., 1900, *E. Ule* (FH), in *Goeppertia hirsuta*, São Leopoldo, 1908, *Rick*, number 292 in Fungi Austro-Americani (as *Phaeangella socia*) (FH); in *Nectandra* sp., João Pessoa, Paraiba, *J. A. von Arx*, 3.10.60 (IMUR 2121-4) (paratype of *Phaeofabraea paralybensis*).

**Phaeofabraea miconiae** Rehm, Ann. Mycol. 7:541. 1909.

Rehm's description is accurate except for his comment on ascospore septation.

CRITICAL SPECIMENS EXAMINED. **Brazil:** (holotype of *Phaeofabraea miconiae* ad folia *Miconiae*, *S. J. Theissen*, São Leopoldo do Sul, 1908 (s). **Venezuela:** Parasitica in stromatibus *Bagnisiopsidis tijucensis* Theiss. & Syd. ad folia *Miconiae ambiguae*, 3.1.1928, *H. Sydow* in Fungi exotici exsiccati, number 865 (FH); auf *Meidothis Pittier* auf *Miconia ambigua*, El Limon bei Puerto La Cruz, I.1928, *H. Sydow* in F. Petrak. *Mycotheca generalis*, number 1451; as above, 17.I.1928, *H. Sydow* (FH).

## EXCLUDED SPECIES

*Phaeofabraea leonensis* Syd., Ann. Mycol. 37:236. 1939.

This species cannot be accommodated here since in the type collection (CMI!) the ascospores are hyaline and the subhymenium and medullary excipulum are dark-celled.

## DISCUSSION

The particular discontinuous pigmentation of the ascospores of these species is a striking and distinctive feature of the genus. The fungicolous habitat of *Phaeofabraea* also distinguishes it. Microscopic features of ascocarp construction are in agreement with those used by Nannfeldt (1932) when originally delimiting the subfamily Encoelioideae, that is,

there are outer cells of the ectal excipulum which are globose, dark-colored, and sometimes become detached to form a mealy covering.

Recently, Korf and Kohn (1976) have discussed the subfamily and have reevaluated its limits. Their redefinition is primarily based on a study of the genus *Phibalis* Wallroth ( = *Encoelia* (Fr.) Karsten). Their concept sets this family apart on biological aspects rather than solely on anatomical features. As important characteristics of this subfamily, Korf and Kohn stressed the following: (1) the leathery to horny consistency of the apothecia; (2) the relative longevity of the apothecia; (3) the ability of the apothecia to revive after drying and then to successfully discharge ascospores; (4) the brown-walled excipular tissue which may or may not become mealy; and (5) the tendency for the ascospores to become allantoid. They also mentioned the occurrence of rhomboidal crystals on the hyphae in the apothecia. These features also are present in *Phaeofabraea*.

*Phaeofabraea* I feel is closely allied to *Phibalis* and is in effect a segregate from the ill-defined *Phaeangella*. This genus has been used to accommodate species in which the ascospores become brown at maturity.

The biological features of this subfamily as outlined by Korf and Kohn suit the genus *Phaeofabraea* particularly well to the epiphyllous habit. The leaf surface is constantly exposed to drying effects of winds and is directly exposed to the sun's rays. Under such conditions, the ability to dry, revive, and discharge spores is particularly important. The presence of short hairs also is of importance in holding water and creating a humid microclimate on the leaf surface. Furthermore, the gel in the medullary excipulum probably plays a role in water retention.

The two species recognized are both known from South America exclusively save for Batra's report of *Phaeofabraea lachnoides* from India. For a true picture of the distribution of these species, as well as finding firmer grounds by which to distingush them, more collections need be sought and perhaps more complete field observations on the host fungus and the host plant need to be provided.

## ACKNOWLEDGEMENTS

Professor Korf kindly read my initial notes and examined some of my material. His advice, confirmation, and encouragement are greatly appreciated and acknowledged. Financial support from the American Philosophical Society (Grant 7316, Penrose Fund), and from the Bussey Institution of Harvard University is also gratefully acknowledged.

## LITERATURE CITED

Batista, A. C., A. Machado, and H. Maia. 1961. *Phaeofabraea parahybensis* n. sp. e outros fungos sôbre *Nectandra* sp. Univ. Recife Inst. Micologia Public. **302**:1–28.

Batra, L. R. 1968. *Phaeofabraea*, a hyperparasitic cup-fungus (Dermateaceae) from the tropics. Amer. J. Bot. **55**:721. [Abstract.]

Korf, R. P., and L. M. Kohn. 1976. Notes on *Phibalis*, type genus of the Encoelioideae (Discomycetes). Mem. New York Bot. Gard. **28**(1):109–118.

Nannfeldt, J. A. 1932. Studien über die Morphologie und Systematik der nicht-lichenisierten inoperculaten Discomyceten. Nova Acta Regiae Soc. Sci. Upsal., ser. 4, **8**(2):1–368.

Rehm, H. 1900. Beitrage zur Pilzflora von Südamerika. VIII. Discomycetes. Hedwigia **39**:80–99.

————————. 1909. Ascomycetes novi. Ann. Mycol. **7**:531–542.

Sydow, H. 1927. Fungi in itenere costaricensi collecti. Ann. Mycol. **25**:1–160.

Sutton, B. C. 1973. Coelomycetes. Chapt. 11 *in* "The Fungi: An Advanced Treatise," eds. Ainsworth, G. C., F. K. Sparrow, and A. S. Sussman, 4A:513–582.

**No. 11. Robert K. Edgar:** An Annotated Bibliography of the American Microscopist and Diatomist Jacob Whitman Bailey (1811–1857) **Donald H. Pfister:** A Note on *Phaeofabraea* and its Placement in the Leotiaceae Subfamily Encoelioideae (Discomycetes) (February 1977).